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GFK-1314E

IMPORTANT PRODUCT INFORMATION

READ THIS INFORMATION FIRST

Product: Factory LAN TCP/IP Ethernet Interface (Type 2)
IC697CMM742-FD Firmware Version 2.00

This is release 2.00 of the IC697 Ethernet Interface Module (Type 2). This module provides network communications using SRTP (Service Request Transfer Protocol) over standard TCP / IP (Transmission Control Protocol and Internet Protocol) on an Ethernet LAN (Local Area Network). The Ethernet Interface supports communications between IC697 PLCs and / or IC693 PLCs equipped with TCP / IP Ethernet Interfaces. The Ethernet Interface can also communicate with IC641 TCP / IP Ethernet programming software and applications which use the TCP / IP Host Communication Toolkit software.

Additional features and benefits for this module include:

- Higher performance compared to IC697CMM741—2 to 4 times higher throughput for data transfers between PLCs with identical Channel setups.
- 32 simultaneous network connections—twice the number supported by IC697CMM741.
- Configuration of Ethernet Interface fully supported within CPU configuration. Centralized IP network configuration management is also supported via standard BOOTP protocol.
- Addressability to other IC697CMM742 Interfaces using DDP names, standard DNS (Domain Name Service) names, or IP addresses.
- Three alternate Ethernet network ports are available on the IC697CMM742 Interface. Two of the network ports, the 10BaseT (twisted pair) and the 10Base2 (thin wire), require no external transceiver. In addition, a standard AUI port is available for use with an external user-supplied transceiver. Only one of the three network ports may be used at a time.

Release 2.00 provides additional features and benefits for this module. All new features require IC641 Configuration Software Version 2.00. The features include **Ethernet Global Data** and **Enhanced Name Resolution** support. A description of these features is provided later in this document.

Compatibility

The IC697CMM742 Ethernet Interface is compatible with the following products:

- IC697 PLC CPU models 781, 782, 914, 915, 924, and 925 loaded with firmware versions 6.00 or later. Limited *Server-mode only* operation is possible with older CPU models (described below). CPU Release 7.0 or higher is required for Ethernet Global Data and Enhanced Name Resolution.
- IC641 programming software version 6.02 or later (required to configure the Ethernet Interface).
- IC697CMM741 Ethernet Interface loaded with TCP / IP software IC651ENS042.
- IC693CMM321 Ethernet Interface.

- Host Communications Toolkit software products, listed below.†
  - Toolkit for Microsoft® Windows® C / C++ Applications (IC641SWP052D or later)
  - Toolkit for Windows NT C / C++ Applications (IC641SWP058B or later)
  - Toolkit for HP-UX C Applications (IC641SWP054B or later)
  - Toolkit for DEC™ VAX / VMS C Applications (IC641SWP053B or later)
  - Toolkit for DEC Alpha AXP / VMS C / C++ Application (IC641SWP057B or later)
  - Host Communication Drivers for Windows (qty.1: IC641SWP050D; qty.10 - IC641SWP051D)

Product Documentation

TCP/IP Ethernet Communications (Type 2) for the IC697 PLC User's Manual, GFK-1246.

TCP/IP Ethernet Communications for the IC69 Station Manager Manual*, GFK-1186.

New Features

Ethernet Global Data

Ethernet Global Data is a mechanism by which one device, referred to as a *producer,* can share a portion of its internal memory with one or more other devices, referred to as *consumers*, at a regularly scheduled periodic rate. The snapshot of internal memory is referred to as an *exchange*. This exchange is uniquely distinguished by a set of identifiers, the *Producer ID* and *Exchange ID*. The Producer ID is assigned to uniquely identify the Ethernet Global Data device on the network (or 'routed' networks). The Exchange ID is a value identifying a specific *exchange definition* within that producing device. An in–depth description of this feature is available through the Online Help system of the configuration software. Use of this feature requires IC697 CPU Release 7.00 or later as well as IC641 Configuration software Version 2.00 or later.

Enhanced Name Resolution

This release of firmware extends the Naming Resolution capabilities to allow configuration of naming parameters via IC641 Configuration Software Version 2.0. These parameters include the Network Address Name and the Name Table. Previous versions of IC697CMM742 firmware restricted naming parameter configuration to station manager commands while in maintenance mode.

Reduction in Fault Logging for Event 12, entry 2 = f

This fault is logged upon receipt of a TCP Reset. Previously released versions of IC697CMM742 firmware would log this condition regardless of the state of the TCP connection. This release of firmware will only log this condition if the connection has not been successfully established. This is to accommodate certain host TCP / IP stacks that routinely terminate connections using TCP Reset (instead of TCP FIN).

† Some versions of HCT do not support the "Send Information Report" COMMREQ. Please refer to the appropriate HCT IPI document for more information.

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LLC Recovery Time Reduced

Whenever a fatal LLC error is encountered (recorded as log event c, entry 2 = 105, 10a, 10b, or 10f) the Ethernet controller on the Ethernet Interface is reinitialized. Previously released versions of IC697CMM742 firmware would retry immediately and then wait 10 seconds before attempting recovery. This release of firmware will now attempt recovery immediately and then once a second for the first 10 seconds, then once every 10 seconds as before.

Increased Queue Sizes

Due to available memory on the IC697CMM742, various queue sizes have been increased to avoid potential network packet discards. These include the LLC receive ring (increased from 64 to 128) and the IP layer input queue (increased from 64 to 128) and the IP layer output queue (increased from 33 to 128).

Enhanced Problem Debugging Tools

Various enhancements have been made in this release of firmware to provide better debugging tools. They include:

Additional Information in Fault Logging for Event 12, entry 2 = 10–1C – TCP Log events (Event 12) that recorded the taking down of a TCP connection did not identify the remote host that was connected. This information can be useful for system troubleshooting and was often impossible to get after the connection came down. TCP log events, entry 2=10 through 1c have now been updated to show the IP address of the remote node in entries 3 and 4.

New Station Manager Command: "killss" – The new "killss" station manager command has been added in this release of the IC697CMM742 TCP / IP firmware. The "killss" command is used to terminate established SRTP Server endpoints. This command is intended for maintenance and diagnostic purposes only. The syntax for the command is as follows:

```
killss all|<SRTP Server endpoint> [<SRTP Server endpoint> [...]]
```

'`killss all`' causes all established SRTP Server endpoints to be terminated. If the endpoint numbers (as shown in the output of '`stat v`' command) are specified, only those endpoints would be terminated. This command will not terminate any endpoints which are not in ESTABLISHED state.

The "killss" command is a *modify* command; therefore, the user is required to be *logged in* before using this command.

Enhanced Station Manager Output for "stat v" – To help in debugging a PLC setup, the number of received requests and the IP address of the client for every SRTP Server endpoint have been added to the display in response to "`stat v`" station manager command.

Operational Notes

Network Bandwidth Utilization

Due to its performance potential, the IC697CMM742 Interface can present a heavy load on the network segment at its maximum operating capacity. It is strongly recommended that caution be taken when using multiple connections operating in an *"as fast as possible"* mode. Tests conducted showed that 32 simultaneous Channels transferring 2 Kilobytes of data per Channel between two IC697CMM742 Interfaces can use up as much as 18% of the total network bandwidth when the Channels are all configured to run *"as fast as possible"* using 91x or 92x CPUs.

The potentially high network bandwidth utilization by the IC697CMM742 Interface can cause higher-than-normal rate of network collisions which may cause timeouts on data transfers. If your application requires many simultaneous network connections between IC697CMM742 Interfaces, it is recommended that the *"minimum interval between host accesses"*, *"read period"*, and *"write period"* used in COMMREQs be set to the required rate for your particular application instead of *"as fast as possible"* so the network does not become overloaded with network traffic to and from the IC697CMM742 Interface.

CPU Performance Limitation

Again, due to its performance potential, the IC697CMM742 Interface can present a heavy load on the CPU at its maximum operating capacity. It is strongly recommended that caution be taken when using multiple connections operating in an *"as fast as possible"* mode especially when a model 781 or 782 CPU is used. The COMMREQ Status Word (CRS Word) may occasionally become FE07 or FE87, which means service requests are made to the CPU faster than the CPU can process them. Although communications will proceed to the next repetition even when this is encountered, data transfer for the current repetition of this connection would have failed to complete.

To avoid this situation, configure the *"minimum interval between host accesses"*, *"read period"*, or *"write period"* to a larger value so the CPU has enough time to process all service requests.

Channel Data Transfer with One Repetition can Exhaust TCP Connections

Because tearing down a TCP connection is time consuming, it is possible that programming your ladder in a certain way can quickly exhaust all available TCP connections. This can be avoided by programming your COMMREQs in a slightly different way.

Your ladder can benefit from the reprogramming if:

- The number of repetitions (word 9 in an Establish Read Channel or Establish Write Channel COMMREQ) is set to one (1) and a new COMMREQ is issued immediately upon completion of the prior one.
- Each successive COMMREQ is directed to the same target device (same IP address).
- Each successive COMMREQ is directed to the same channel number.

To avoid TCP connection exhaustion you should set the number of repetitions (COMMREQ word 9) to two (2) and set the read / write period (COMMREQ words 10

and 11) to be very large, such as 60 seconds. With these parameters you can issue the first COMMREQ, wait for the COMMREQ Status (CRS) word to turn to one (1), then issue the next COMMREQ, wait for the CRS word to turn to one, etc., and there will not be TCP connection exhaustion problems. Interrupting an active channel allows the reuse of an existing TCP connection, while a repetition count of one starts the time-consuming TCP connection teardown immediately upon completion of the first transfer.

Special Notes on Release 6 CPUs

When your ladder program accesses %P and %L memories through COMMREQs, and a Release 6 CPU is used on the server PLC, the COMMREQ Status Word (CRS Word) may occasionally return F405.

AUI Cable Removal

Power to the PLC must be turned off whenever the transceiver cable (AUI cable) is connected or disconnected at the IC697CMM742 Interface AUI port.

Ethernet Interface PLC Installation Restrictions

The IC697CMM742 Interface may not be used in an IC697 PLC expansion rack. The Ethernet Interface will not function properly if placed there.

There may be no more than four (4) LAN Interfaces in a single PLC. This limit applies to the total number of IC697CMM721, IC697CMM731, IC697CMM741, and IC697CMM742 boards in the PLC.

Some PLC Fault Table Entries are Imprecise

In the PLC Fault Table display of the IC641 Programming software, the following messages may not provide a meaningful description of the problem for the Ethernet Interface:

- "LAN PROM / software mismatch; running soft Sw util"
- "LAN system-software fault; resuming"
- "LAN Severe Network Problem; Attempting Recovery"

Should you see these messages in the IC641 software, select the message and enter F10 (ZOOM) or CTRL+F to display the error codes associated with the message. Then refer to GFK-1186A, Appendix B: *"Exception Log Event Description"* for an accurate explanation of the error codes.

SQE Enable

If the AUI network port is used, the IC697CMM742 Interface requires that the SQE test be enabled on the external transceiver connecting it to the Ethernet LAN. Make sure your transceiver has SQE enabled.

PLC Power Supply Requirements

If the AUI network port is used, the IC697CMM742 Interface requires that the PLC include a power supply which supplies 12Vdc (IC697PWR711, -721, -724, -731, or -748).

Restrictions and Significant Open Problems

Open Problems in Release 2.00 Firmware

This section describes known limitations in the current firmware, Release 2.00.

ID Code	Description
54556	The IC697CMM742 Interface can not communicate with the local PLC CPU when a PLC load or a store operation is in progress. A PLC load or store operation (via IC641 software WSI, Serial, and / or Ethernet) has priority over all other communications. During a PLC load or store operation, it is possible for channels or server connections to experience time out errors, which may lead to disconnections. Possible exception log entries include 8 / 8, 8 / 38, and 8 / 40. Whenever these backplane errors are logged, there are likely to also be additional exception logs for terminated TCP connections and SRTP Server and Channel API errors.
60873	Log Event c, entry 2 = 10f has been witnessed during extremely heavy traffic conditions on the Local Area Network. A potential workaround is to increase the size of the LLC transmit ring. The current value is 3, implying a ring size of 8. A value of 4 specifies a transmit ring size of 16, value 5 specifies a ring size of 32. This value can be changed in the IC697CMM742 Maintenance mode using the station manager 'chparm ltxringlen' command.

Changes and Additions to the User's Manual (GFK-1246)

Instructions for Upgrading Firmware

These instructions are provided in Appendix E of the User's Manual.

Special Notes on Using IC697CMM742 with PLC CPUs (Versions 4.12 - 5.50)

The IC697CMM742 Ethernet Interface (Type 2) is designed for high-performance operation and convenient installation with IC697 PLC CPU versions 6.00 and later. These PLC CPUs recognize and support the Ethernet Interface (Type 2), and provide the high throughput demanded by this product. GE Fanuc recommends use of IC697 PLC CPUs with version 6.00 and later firmware to obtain the full capabilities of the Ethernet Interface (Type 2).

Versions 1.10 and later of the Ethernet Interface (Type 2) also provide restricted operation with IC697 PLC CPUs running firmware versions 4.12 through 5.50. These notes describe the necessary Ethernet Interface configuration and restricted operation with these PLC CPUs.

The Ethernet Interface (Type 2) cannot be used with PLC CPU firmware versions prior to 4.12.

Ethernet Interface Installation and Configuration

The Ethernet Interface (Type 2) is installed in the main PLC rack as described in Procedure 1 in Chapter 2 of the *TCP/IP Ethernet (Type 2) Users Manual.*

IC697 PLC CPU firmware versions 4.12 though 5.50 do not accept PLC configuration data for the Ethernet Interface (Type 2). Thus this Ethernet Interface cannot be configured as described in Procedure 2 in Chapter 2 of the User's Manual. An alternate Procedure 2 is provided below; this procedure uses a user-supplied computer terminal or equivalent plus the Station Manager software within the Ethernet Interface to enter the necessary configuration data. The Station Manager is completely described in the *TCP/IP Ethernet Station Manager Manual*. Please refer to this manual for complete details on connecting a terminal to the Station Manager serial port of the Ethernet Interface, and on the various Station Manager commands used within this alternate Procedure 2.

Alternate Procedure 2: Configuring the Ethernet Interface (with PLC CPU versions 4.12 through 5.50)

IC697 PLC CPU firmware versions prior to version 6.00 do not accept configuration data for the Ethernet Interface (Type 2). Thus the Ethernet Interface (Type 2) *cannot* be configured by the IC641 PLC Configuration software. Instead, a dummy module must be configured in place of the Ethernet Interface; the Station Manager software within the Ethernet Interface is then used to enter configuration data directly at the module.

First, create a dummy entry in the PLC Configuration for the rack and slot where the Ethernet Interface is installed.

1. Connect a PC running the IC641 PLC Configuration software to the PLC via the built-in serial port on the PLC CPU module. Then access the I/O Configuration screen of the IC641 PLC Configuration software.

2. Move the cursor to the rack and slot where the Ethernet Interface (Type 2) is installed. This slot must be configured as a "3rd Party VME module" as follows: From the I/O Configuration screen, press the `vme` soft key (`F7`). From the next screen, press the `vme` soft key (`F1`), then move the cursor to the `3RD PARTY VME MODULE` selection and press the `Enter` key to select. Press the `Escape` key to return to the I/O Configuration screen. The slot containing the Ethernet Interface will be displayed as "`3PY VME`".

   If there is no **`vme`** soft key in the I/O Configuration screen, configure the rack and slot where the Ethernet Interface (Type 2) is installed as a "Blank jumper" as follows: Press the **`m70_io`** soft key **`(F1)`**. From the next screen, press the **`other`** soft key **`(F7)`**, then move the cursor to the BLANK SLOT INTERRUPT JUMPER selection and press the **`Enter`** key to select. Press the **`Escape`** key to return to the I/O Configuration screen. The slot containing the Ethernet Interface will be displayed as "`JUMPER`".

3. Press the `Escape` key to save the PLC configuration to disk.

4. Use of the dummy module type above will always result in a Configuration Mismatch error at each power up, configuration store, or Ethernet Interface restart. To prevent this error from putting the PLC into STOP/FAULT state, change the severity of this error as follows:

From the main PLC Configurator screen, press the **cpu** soft key **(F2)** to display the CPU configuration, then press the **fltcfg** key **(F5)** to display the Fault Categories. Press the down arrow key **()** repeatedly until `Fault Type` is "`System Config Mismatch`", then press the Tab key to change the `Fault Category` from "`F`" (= Fatal) to "`D`" (= Diagnostic). Press the **Escape** key twice to store the fault categories to the PLC CPU and return to the main PLC Configurator screen

5. Store the PLC configuration to the PLC.

   Now configure the Ethernet Interface (Type 2) locally using its onboard Station Manager. Refer to the *TCP/IP Ethernet Station Manager Manual* for complete information on Station Manager operation.

6. Connect a standard ASCII terminal or PC-based terminal emulator to the Station Manager (RS-232) serial port on the Ethernet Interface. Use the NODE Station Manager command to verify that the terminal or emulator is properly communicating with the Station Manager software in the Ethernet Interface. A typical NODE command is shown below:

   ```
   > node
   IC697 PLC Factory LAN Ethernet Interface (Type 2)
   Copyright (c) 1996. All rights reserved.
   Version 1.10  (25A1) TCP/IP
   Version 1.00  (12A1)  Software Loader
   IP Address =  0.0.0.0
   MAC Address = 080019010688
   *** PLC CPU version (5.00) supports restricted LAN Interface operation:
   ***   SRTP server only (client operation is not permitted)
   ***   LAN Interface cannot be configured with PLC Configurator
   ***      (Use CHSOSW Station Manager cmd to enter module configuration)
   ***   PLC CPU version 6.00 or higher is required for full operation
   ```

   If the Ethernet Interface has not been previously configured, the NODE output will also indicate that the Ethernet Interface is waiting for a valid IP address.

7. Use the LOGIN Station Manager command to "log in" in order to access the Modify-level commands needed later. The LOGIN command is shown below:

   ```
   > login
   ```

   After entering the LOGIN command, the Station Manager prompts for the Modify-level password:

   ```
   Password:
   ```

   Enter your password (which is not echoed). The default password is: `system` (lower case). If the password matches the current Modify-level password, a confirmation message is displayed; the Station Manager prompt changes from "`>`" to "`=`".

8. Use the Modify-level *MAINT* Station Manager command to restart the Ethernet Interface into the Maintenance state. The *MAINT* command is shown below:

   ```
   = maint
   Restarting module into Maintenance state
   ```

The Ethernet Interface is restarted into the Maintenance state. After approximately 20 seconds, another NODE output is automatically generated when the restart is complete. The display will also indicate that the Ethernet Interface is the Maintenance state; the Station Manager prompt is "*". Modify-level login is not required in the Maintenance state.

9. Use the *CHSOSW* Station Manager commands to enter the configuration data for this Ethernet Interface. The IP addressing parameters (*ip_address*, *subnet_mask*, *gateway*, and *name_server*) must be set to values supplied by the person in charge of your network (the network administrator). TCP / IP network administrators are familiar with these parameters. It is important that these parameters are correct, otherwise the Ethernet Interface may be unable to communicate on the network and / or network operation may be corrupted. It is especially important that each node on the network is assigned a *unique* IP address.

   Enter the IP Address as follows:

   *** chsosw ip_address <a.b.c.d>**
   where **<a.b.c.d>** is the unique dotted decimal IP address for this node.

   Enter the Subnet Mask as follows

   *** chsosw subnet_mask <a.b.c.d>**
   where **<a.b.c.d>** is the dotted decimal subnet mask for this network segment.

   Enter the Gateway IP Address as follows

   *** chsosw gateway <a.b.c.d>**
   where **<a.b.c.d>** is the unique dotted decimal IP address of the gateway device.

   Enter the Name Server IP Address as follows:

   *** chsosw name_server <a.b.c.d>**
   where **<a.b.c.d>** is the unique dotted decimal IP address of the name server device.

   The *CHSOSW* command may also be used to change the parameters for either serial port on the Ethernet Interface in cases where the default serial port configuration values are not used.
   Refer to the *TCP/IP Ethernet Station Manager Manual* for further information.

   A typical *CHSOSW* command is shown below:

   *** chsosw ip_address 3.0.0.1**

   Once entered, the configuration parameters are retained in non-volatile flash memory for use each time the Ethernet Interface is powered up or restarted. Configuration needs to be re-entered only when changing one or more configuration parameters.

10. Use the SOSW Station Manager command to verify that all configuration parameters have been set to the proper values. A typical SOSW command is shown below:

```
* sosw
<<< Soft Switch Data >>>

IP Address   = 3.0.0.1       (TCP/IP values from Soft Switches)
Subnet Mask  = 0.0.0.0
Gateway      = 0.0.0.0
Name Server  = 0.0.0.0

Port 1 (Station Manager):     Port 2 (S/W Loader):
Data Rate      = 9600         Data Rate     = 19200
Parity         = NONE         Parity        = ODD
Stop Bits      = 1            Stop Bits     = 1
Flow Control   = NONE         Flow Control  = NONE
TurnA Delay    = NONE         TurnA Delay   = NONE
Timeout        = LONG         Timeout       = LONG

Source of Soft Switches: Internal Backup
```

11. When all configuration parameters have been correctly entered, use the *RESTART* Station Manager command to restart the Ethernet Interface into normal operation. The *RESTART* command is shown below:

```
= restart
Restarting module
```

The Ethernet Interface is restarted into the Operational state. After approximately 20 seconds, another NODE output is automatically generated when the restart is complete. The NODE output should indicate the IP Address configured in Step 9, above. (The Subnet Mask, Gateway IP Address and Name Server IP Address can be displayed by the SOSW command, as described in Step 10, above.) The Ethernet Interface is now properly configured and ready for use.

Please proceed to Procedure 3 in Chapter 2 of the User's Manual to verify proper operation of the Ethernet Interface with the new configuration data.

Ethernet Interface Operational Restrictions

The Ethernet Interface (Type 2) operates with some restrictions when used with IC697 PLC CPU versions 4.12 through 5.50. These Operational Restrictions, together with differences in Startup, Station Manager and Software Loader operation, are described below.

Operational Restrictions

1. COMMREQ operation is not supported. Any COMMREQ issued to the Ethernet Interface is ignored; a COMMREQ Status (CRS) word is *not* returned to the PLC. Instead, the Ethernet Interface generates an event in its internal exception log (Event = 1c; Entry 2 = 0011) indicating that the Channel API task is not active. The Ethernet Interface also generates an entry in the PLC Fault Table:
   ("LAN system-software fault; resuming")

2. The Ethernet Interface returns neither LAN Interface Status (LIS) nor Channel Status data to the PLC.

3. PLC CPU models IC697CPU73x and IC697CPU77x may limit the overall performance of a PLC used as a server device. Under heavy load from other clients and hosts on the network, the server PLC may generate errors with major error code 07, indicating that the volume of requests from the network have exceeded the processing capacity of the PLC CPU. If possible, try to reduce the volume of requests to the server PLC when this condition occurs. If the system design requires data rates beyond the capacity of the server PLC CPU, please consider upgrading to a more powerful CPU model.

Startup

1. Upon each powerup or restart of the Ethernet Interface, or configuration store to the PLC, the following entry will be generated in the PLC Fault Table for the slot containing the Ethernet Interface:
   `("Reset of, addition of, or extra option module").`

2. When operating with PLC CPU versions prior to 6.00, the Ethernet Interface does *not* generate the exceptions or PLC Faults that normally occur when Ethernet Interface does not receive module configuration from the PLC CPU.

3. Each powerup and restart of the Ethernet Interface takes approximately 20 seconds. This is roughly 10 seconds longer than required when the Ethernet Interface is used with PLC CPU versions 6.00 and later.

Station Manager

1. .The STAT C command (PLC Driver status) does not display the current PLC CPU state(RUN / STOP and I / O ENABLED / I / O DISABLED).

2. In the TALLY C command output (PLC Driver tallies), the "PlcSweep" tally does not count the number of PLC sweeps. This tally should be ignored.

3. The STAT H command (Channel API status) always indicates "`Channel API task not initialized`"

4. As detailed above in the *Ethernet Interface Installation and Configuration* section, special restricted operation notification is displayed with the startup message and by the NODE command.

Software Loader

IC697 PLC CPU versions 6.00 and later gracefully allow option modules like the Ethernet Interface to suspend communication with the PLC CPU while loading new firmware. Since this capability is not present in PLC CPU versions 4.12 - 5.50, special operations are required when loading new firmware into the Ethernet Interface.

Follow the steps in Appendix E of the User's Manual to load new firmware into the Ethernet Interface; step 2 of the firmware installation process must be expanded, as described below:

2. (from Appendix E)
   Hold the Reset button on the Ethernet Interface until the bottom LED (STATUS) turns ON. Upon releasing the button, all 4 LEDs will blink in unison. This signifies that the Interface is in the Software Loader state.

   2a. (new)
   After 18-20 seconds, the PLC CPU will indicate that communication with the Ethernet Interface has been lost. A PLC Fault Table entry will be generated "Loss of option module"; all LEDs on the Ethernet Interface will turn OFF and remain so indefinitely.

   2b. (new)
   Press the Restart button again. The Ethernet Interface will restart immediately without any communication to the PLC CPU. The OK LED will blink, turn OFF, and blink again. After approximately two minutes, the Ethernet Interface will enter the Operational state. (The absence of PLC CPU communication is of no concern at this time.)

   2c. (new)
   Hold the Reset button on the Ethernet Interface until the bottom LED (STATUS) turns ON. This time, upon releasing the button, the OK LED will blink for approximately 30 seconds, then all 4 LEDs will blink in unison to signify the Ethernet Interface is in the Software Loader state.

The Ethernet Interface can now safely accept the firmware update. Proceed with Steps 3 through 9 in Appendix E of the User's Manual. When the loading process is complete, the Ethernet Interface will automatically restart. Proceed to new Step 10 to restore communication between the PLC CPU and the Ethernet Interface.

10. (new)
    Once the Ethernet Interface begins to restart upon load completion (OK LED is blinking; other LEDs are OFF), turn the PLC power supply OFF and then ON; this is necessary to establish communication between the PLC CPU and the Ethernet Interface.